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Dated 20 April 2004

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P01/7700 0.00-0306131.4

Request for grant of a patent

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NP10 8QQ

1. Your reference — FIND / P27529GB

2. Patent application number *(The Patent Office will fill in this part)* — 0306131.4

3. Full name, address and postcode of the or of each applicant *(underline all surnames)* — **Finden Coatings Limited**
Karlsruhe House
Queensbridge Road
Nottingham
NG2 1NB
United Kingdom

Patents ADP number *(if you know it)* — 08586740001

If the applicant is a corporate body, give the country/state of its incorporation — United Kingdom

4. Title of the invention — AN ADHESIVE FABRIC

5. Name of your agent *(if you have one)* — **ERIC POTTER CLARKSON**
PARK VIEW HOUSE
58 THE ROPEWALK
NOTTINGHAM
NG1 5DD

"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

Patents ADP number *(if you know it)* — **1305010**

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

Country	Priority application number *(if you know it)*	Date of filing *(day / month / year)*

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing *(day / month / year)*

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:*

a) *any applicant named in part 3 is not an inventor; or*
b) *there is an inventor who is not named as an applicant, or*
c) *any named applicant is a corporate body. See note (d))*

YES

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form. Do not count copies of the same document

Continuation sheets of this form	
Description	8
Claims(s)	1
Abstract	0
Drawing(s)	1

10. If you are also filing in any of the following, state how many against each item.

Priority Documents	0
Translations of priority documents	0
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	NO
Request for preliminary examination and search *(Patents Form 9/77)*	YES
Request for substantive examination *(Patents Form 10/77)*	NO
Any other documents *(please specify)*	

11. I/We request the grant of a patent on the basis of this application.

Signature Eric Potter Clarkson Date 17 March 2003

ERIC POTTER CLARKSON

12. Name and daytime telephone number of person to contact in the United Kingdom **0115 9552211**

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AN ADHESIVE FABRIC

This invention relates to an adhesive fabric that adheres to the body.

Narrow fabrics comprising friction-generating materials are used to attach garments and accessories onto the body. For example, in hosiery elastomeric narrow fabrics retain "stay-up" stockings in position.

This is currently achieved by forming around the internal opening of the stocking one or more annular bands of a silicone elastomer having a high coefficient of friction and a high modulus of elasticity. The bands act to hold up the stocking by applying a constrictive force, such as that generated from an elasticated ring or strap in order to maximise frictional grip.

While the above may achieve good garment positioning, it is undesirable as it can also cause discomfort and pain to the wearer. After an extended wearing period, and/or if the annular band of elastomer is a particularly tight fit, the narrow band will press into the wearer's flesh causing pain, localised temporary damage and reduced blood circulation.

According to one aspect of the invention there is provided an adhesive fabric capable of adhering to the skin of a body, comprising: a barrier layer bonded on one side of a fabric substrate and a cured adhesive silicone gel layer bonded to the barrier layer whereby the barrier prevents absorption of the adhesive silicone gel coating into the fabric substrate.

The barrier is preferably a silicone elastomer that is able to bond/key with the fabric substrate. The silicone elastomer is ideally quick curing and has a relatively high viscosity in its uncured state, namely between 30,000 and 180,000 MPas.

The silicone gel used is preferably a polydimethylsiloxane such as the gel known as RTV 2K GEL TP 3841™ sold by GE Bayer Silicones GmbH & Co. KG. This gel is supplied in two parts which require mixing prior to use. In its mixed state this gel has a low viscosity of about 7500 MPas.

The fabric substrate may be a woven, non-woven or knitted elastomeric fabric.

The adhesive fabric may be re-usable, whereby lost adhesion is re-generated by washing the adhesive fabric in a conventional manner.

The thickness of the barrier layer is preferably chosen to be sufficient to ensure that an impervious layer is formed. Accordingly, for fabric substrates which are smooth and non-hairy, a thinner barrier layer may be adopted compared to a fabric having a rough and/or hairy surface. For fabrics having a hairy surface, it is desirable for the barrier layer to be thick enough to encapsulate therein the surface hairs in order to prevent the hairs acting as wicks.

Typically, it is envisaged that the barrier layer will have a thickness in the range of 0.05 to 0.5 mm, more preferably in the range of 0.1 to 0.3 mm, more preferably 0.15 to 0.225 mm.

In addition to permeability of the barrier layer, the thickness of the barrier layer when composed of a silicone elastomer is also chosen bearing in mind the degree of elasticity it is desired to provide to the fabric substrate, i.e. the thicker the barrier layer the greater the power of stretch recovery imparted to the fabric substrate.

The thickness of the silicone gel layer is preferably chosen to provide a desired degree of adhesion to, for example, the skin of a body. Generally, the adhesive power is a function of thickness, viz. the thicker the layer of silicone gel, the greater the adhesive power.

Typically, the thickness of the silicone gel layer is chosen to be in the range of 0.01 to 0.5 mm, more preferably 0.2 to 0.4 mm, more preferably 0.3 to 0.33 mm.

There is further provided a method for manufacturing an adhesive fabric including: extruding a layer of a curable barrier material onto a fabric substrate; curing the barrier material to form a barrier layer; extruding a layer of a curable adhesive silicone gel on top of the barrier layer and curing the adhesive silicone gel.

Preferably the barrier layer is a silicone elastomer and the silicone gel is extruded onto the silicone elastomer before it is cured so that curing of both the silicone elastomer and gel is performed simultaneously.

The invention is hereinafter further described with reference to the accompanying drawing, in which –

Figure 1 is a schematic side view of an adhesive fabric according to the invention during production.

The adhesive fabric 10 illustrated in Figure 1 comprises a fabric substrate 11 coated on one side with a layer of a barrier material 12 which is in turn coated with a layer of an adhesive silicone gel 13.

This construction allows for only one side of the fabric substrate to exhibit adhering properties and avoids known problems of adhesive substances undesirably seeping through to the other side of the fabric. The layer of barrier material 12 lying between the fabric substrate 11 and silicone gel layer 13 prevents the transfer of silicone gel into the fabric.

Rather than relying on frictional force alone to attach a fabric to the body, the adhesive fabric uses adhesion. By incorporating a gel having the desired level of tackiness to hold the fabric in place, the use of constrictive pressure is less significant.

The silicone gel 13 is of a type known as RTV GEL TP 3841™. In its mixed state its viscosity is about 7500 MPas. This silicone gel exhibits an appropriate degree of stickiness that allows the adhesive fabric to be easily peeled off the body without being too adhesive or not adhesive enough.

Silicone gels are very suitable for direct use against the skin. Their soft nature encourages a cushioning effect and reduces pressure on the wearer. Particularly in a medical environment, the use of silicone gels reduces irritation to burns, cuts and other wounds.

Silicone gels are further capable of absorbing then slowly releasing a 'carried' solution such as antiseptic medication, vitamins and medicaments used in transdermal drug delivery.

Although not essential, the adhesive silicone gel can be sufficiently sticky to adhere to the fabric substrate when the adhesive fabric is wound around on itself. This is envisaged to be quite a useful feature when applied to surgical bandages. With hosiery applications this level of adhesion is not necessary as the adhesive fabric does not wind on itself.

After repeated wear, the stickiness of the adhesive gel may deteriorate particularly as it attracts dust, dead skin cells and other particles. However, the adhesive qualities of the adhesive fabric can be re-generated by washing the adhesive fabric (or garment) in a conventional manner. It is estimated that the adhesive fabric can be washed up to fifty times and still retain a satisfactory and workable level of adhesion.

The barrier material 12 is preferably a silicone elastomer that is compatible with the fabric substrate for ensuring a strong bond between them. The barrier material is also preferably quick to cure thereby enabling the uncured barrier material to be extruded into the fabric substrate and cured before it penetrates too deeply into the fabric structure. Accordingly after application and curing of the barrier material, it will not have penetrated through to the opposite surface of the fabric. In its uncured state the barrier material preferably has a viscosity of about 30,000 to 180,000 MPas, more preferably 50,000 to 150,000 MPas.

The fabric substrate 11 may be any type of knitted, woven or non-woven fabric made from natural and/or man made fibres.

The fabric may be a stretch or non-stretch fabric. For stretch fabrics, the fabric may include elastomeric yarns in order to provide the fabric with enhanced stretch recovery.

With this type of fabric a combination of adhesive and friction forces may operate to attach the fabric to the body.

The invention is particularly useful in the holding up of stockings. In this application the fabric substrate comprises a band of fabric at the stocking

top coated internally of the stocking with at least one band of cured silicone gel 13 bonded to the fabric via the layer of barrier material 12. Holding up of the stocking is achieved primarily by the adhesion qualities of the silicone gel 13 rather than a combination of surface friction and applied constrictive force.

The band of fabric at the stocking top which defines the substrate 12 may be defined by a separately applied band of fabric, such as for example a lace band, or may be defined by part of the stocking fabric.

The barrier layer 12 is preferably a silicone elastomer and may be chosen to be of a thickness to enhance the stretch recovery capabilities of the fabric substrate to which it is applied. Alternatively the thickness of the layer may be chosen such that they do not enhance the stretch recovery of the underlying fabric, i.e. the fabric's stretch recovery properties are not materially affected by the applied barrier layer.

Another particular application for the present invention is as a medical bandage wherein the fabric substrate is a knitted stretch fabric.

Figure 1 schematically illustrates the production of the adhesive fabric. A length of fabric substrate 11 is fed continuously from a supply (not shown) past two extrusion heads and to a take-up reel (not shown). The first head 16 extrudes the silicone elastomer to form a film of barrier 12 coating the fabric substrate.

In one embodiment, before reaching the second head 17 the barrier material 12 is cured by the application of heat and so is prepared to be coated with the adhesive silicone gel.

The second extrusion head 17 supplies the adhesive gel 13. A thin coat of gel is extruded on top of the barrier material 12 as it moves past the second extrusion head.

The silicone gel is then cured by the application of heat. A release paper (not shown) is preferably laid upon the silicone gel layer during passage of the adhesive fabric to the take-up reel to enable the fabric to be wound upon itself whilst protecting the adhesive.

In an alternative embodiment, curing of the silicone elastomer does not occur between extrusion heads 16, 17. Instead, the silicone gel is extruded onto the uncured silicone elastomer 12 and both the silicone elastomer and gel are cured simultaneously downstream of the extrusion head 17.

Preferably the silicone gel is a fast curing gel, for example has a cure time of less than 10 seconds. In its uncured state the adhesive silicone gel has a low viscosity. Without first coating the substrate with the barrier the silicone gel would penetrate through the fabric substrate. This would undesirably result in silicone gel being exposed on the uncoated side of the fabric substrate and thus undesirably render it sticky to the touch. This problem increases in proportion to the amount of silicone gel applied.

The construction of the adhesive fabric in accordance with the invention avoids this problem and enables a fabric to be produced having only one adhesive side with the other side remaining unaffected by the adhesive gel irrespective of the amount of gel being applied.

It is envisaged that adhesive fabric according to the invention may find many uses. For example, it may be used as straps for holding in place garments or prostheses. It may also be used in lingerie to enable a garment to be held in place, e.g. a strapless bra.

It is also envisaged that fabric of the present invention may be used in applications where two pieces of the fabric are used with the intent of the gel coating of one piece of fabric adhering to the gel coating of another piece of fabric. With such an arrangement, the gel to gel bonding provides a relatively high sheer strength with a relatively low peel strength. This enables the fabric pieces to be easily separated by a peeling action and subsequently re-attached to one another. Accordingly such an arrangement could be used in a similar manner to a hook and loop type fastener (of the VELCRO® type) or any other type of application where a relatively high sheer strength and relatively low peel strength are required.

Accordingly, in another aspect, the present invention provides a fastener comprising a first component which is detachably securable to a second component, the first and second components comprising a fabric having an adhesive surface defined by a layer of silicone gel.

CLAIMS

1. An adhesive fabric capable of adhering to the skin of a body, comprising: a barrier layer bonded on one side of a fabric substrate and a cured adhesive silicone gel layer bonded to the barrier layer whereby the barrier prevents absorption of the adhesive silicone gel coating into the fabric substrate.

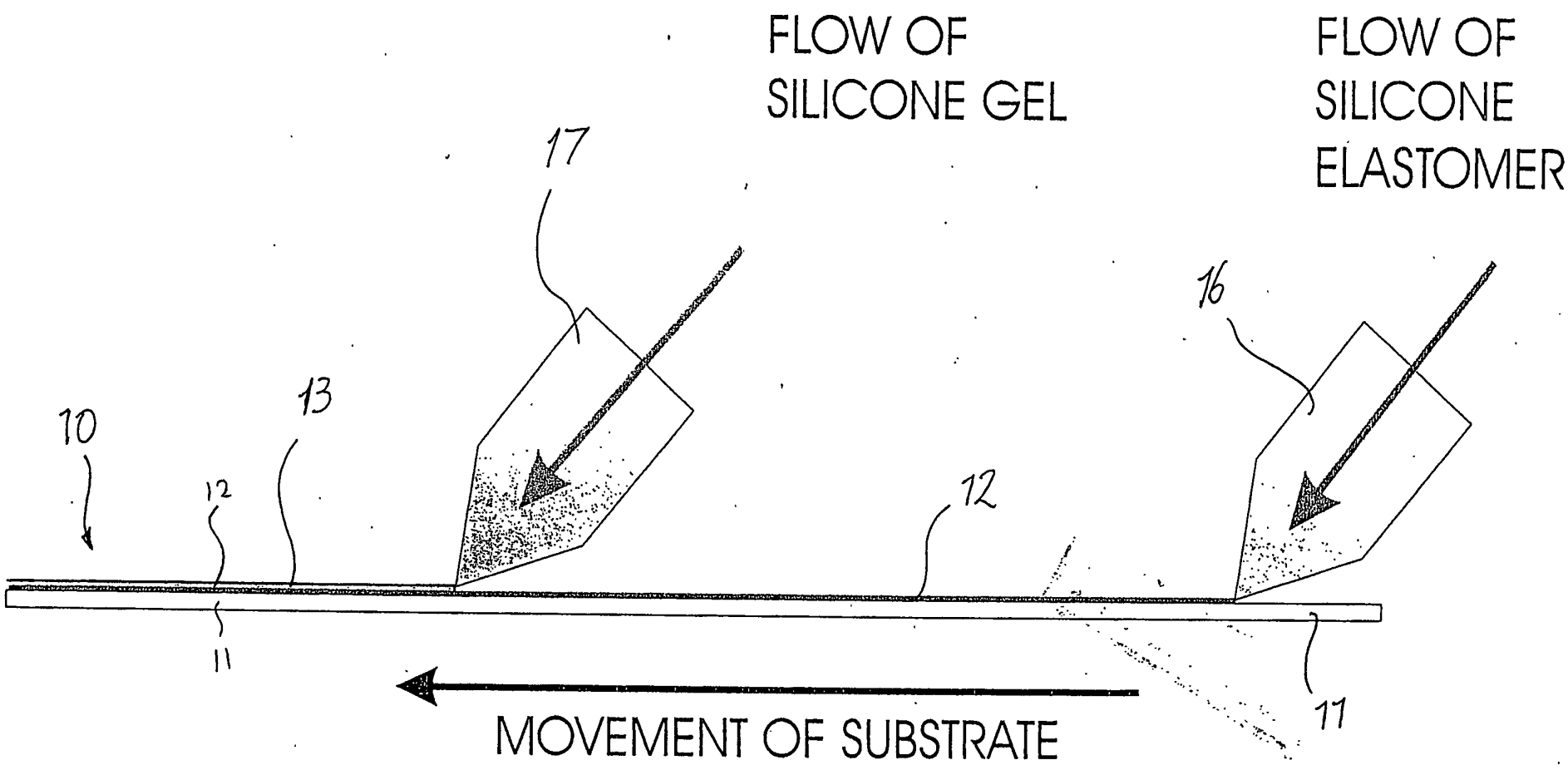
2. The adhesive fabric as claimed in Claim 1 wherein the barrier material is a silicone elastomer.

3. The adhesive fabric as claimed in Claims 1 or 2 wherein the silicone elastomer has a viscosity of between 50,000 and 150,000 MPas in its uncured state.

4. A method for manufacturing an adhesive fabric including: extruding a layer of a curable barrier material onto a fabric substrate; curing the barrier material to form a barrier layer; extruding a layer of a curable adhesive silicone gel on top of the barrier layer and curing the adhesive silicone gel.

5. A method according to Claim 4 wherein the adhesive silicone gel is extruded onto the extruded barrier material prior to curing of the barrier material.

FIGURE 1


FLOW OF
SILICONE GEL
FLOW OF
SILICONE
ELASTOMER
17
16
10
13
12
12
11
11
MOVEMENT OF SUBSTRATE

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